

REMARKS

The present Response is intended to be fully responsive to all points of objections and/or rejections raised by the Examiner and is believed to place the application in condition for allowance. Applicants assert that the present invention is new, non-obvious and useful. Prompt reconsideration and allowance of the pending claims are respectfully requested.

Status of the Claims

Claims 1-20 are pending in the current application.

Remarks to Claim Rejections

Claim Rejections - 35 USC §103

The Office Action of October 1, 2010 rejected claims 1-5, 7-8, 10-13, 15, and 17-19 under 35 U.S.C. §103(a) as being unpatentable over Stamper (US 2002/0130388) in view of Smalley et al. (US 2002/0159944, “Smalley”) further in view of Lee et al. (US 2002/0048143, “Lee”).

Applicants respectfully disagree.

Applicants respectfully submit that independent claims 1, 2, and 11 recites distinctive features and elements that are not taught, suggested, or even implied by prior art references of record, whether it is Stamper, Smalley, or Lee, alone or in combination. Such distinctive features include, *inter alia*, “a trench in said substrate” and “conductive carbon nanotubes lining said trench” of the claimed trench-type storage device.

The Office Action of October 1, 2010 contends, after admitting that Stamper does not teach conductive layers 32 and 44 being a conductive carbon nanotube, that Smalley teaches a similar device wherein the capacitor electrode is formed of conductive carbon nanotubes (see **page 4, lines 3-5 of the Office Action**).

Applicants respectfully disagree.

Applicants respectfully submit that Smalley does not teach, suggest, or imply any capacitor structures. Applicants have carefully analyzed the cited paragraphs [0018] and [0029], even the entire reference, and were unable to find any evidence indicating that Smalley teaches a trench capacitor that is similar to the capacitor structure shown in FIG. 1 of Stamper, contrary directly to what is contended by the Office Action. Applicants have made similar argument in a response to the July 22, 2010 Office Action and such argument was indicated as persuasive (see **page 14, lines 12-13 of the Office Action**).

Since Smalley does not teach any capacitor structures, in particular one that is similar to the capacitor structure in Stamper, there is no material base and support for the Examiner's subsequent argument (see **page 4, lines 6-11 of the Office Action**) that it would have been obvious to modify Stamper with Smalley because such argument relies upon the presumption that Smalley teaches such a "similar device" (see the word "Therefore", in **page 4, line 6 of the Office Action**).

In face, the Office Action later contradicted the previously made allegation by admitting that Smalley does not show the structure of carbon nanotubes in the device (see **page 4, lines 12-13 of the Office Action**). Such clear admission effectively nullifies the validity of argument that it would have been obvious to combine Smalley with Stamper.

Moreover, Applicants would like to point out that the alleged motivation bears no relevance in motivating a person skilled in the art to combine Smalley with Stamper. Even though Smalley stated that "purified carbon nanotubes are stable and resistant to environment attack and thus enhancing the performance of the device", such statement is only relevant when being compared with using carbon nanotubes that are not purified. Smalley never teaches, suggests, or even implies that purified carbon nanotubes will enhance the performance of devices that use metal such as tantalum-nitride/tantalum in a the capacitor structure shown in FIG. 1 of Stamper.

In view of above, Applicants respectfully submit that a person skilled in the art will not have had any motivation to combine Smalley with Stamper because the above alleged benefit or incentive simply does not exist.

More importantly, Applicants would like to point out, respectfully, that Stamper does not even teach a trench that is formed in a substrate. In Stamper, the alleged substrate 15/20 is not a substrate but an insulator 20 formed on top of a substrate 15. Stamper specifically states that “apparatus 10 including a substrate 15, an insulator layer 20 ...” (para. [0032]) and “Insulator layer 20, also known as interlevel dielectric insulator, is composed of an insulator material and is formed upon substrate 15” (para. [0033]). Therefore, it is apparent that insulator 20 is NOT a substrate but an interlevel dielectric (ILD) layer. The alleged trench 31 in Stamper is factually formed inside the ILD layer 20 and not in substrate 15, contrary to what is specifically required by claims 1, 2, and 11.

The Office Action of October 1, 2010 further contends that Lee discloses a similar device wherein the electrodes are formed of vertical multiple carbon nanotubes.

Applicants respectfully disagree.

Applicants would like to point out that the capacitor of Lee, as being illustrated in FIG. 1, has a structure that is entirely different from that described by Stamper to be even remotely called a “similar” structure. For example, the capacitor of Lee is not formed inside a substrate; does not have a trench; the nanotubes do not line the not-even-existing trench; and there is no trench conductor in direct contact with the nanotubes at all. More importantly, the capacitor of Lee separates the two electrodes with electrolyte, while the capacitor of Stamper does not use electrolyte, and therefore is an entirely different type of capacitor from that of Stamper.

Since the capacitor of Lee is a different capacitor whose structure does not even bear any similarity to that of Stamper, and since there is no capacitor structure at all being disclosed by Smalley, it is respectfully submitted that Lee cannot be possibly combined with either Stamper or Smalley, in particular in the absence of any teaching on a possible method of combining. There is no factual base to allege obviousness of doing so either.

According to MPEP 2142, in order to establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim

limitations. In view of the above, Applicant respectfully submits that claims 1, 2, and 11 are not obvious over Stamper, Smalley, or Lee whether alone or in combination, since a *prima facie* case of obviousness against claims 1, 2, and 11 have not been properly established, and are patentable.

Claims 3-5, 7, 10, and 18-19 depend from claim 1; claim 8 depends from claim 2; and claims 12-13, 15 and 17 depend from claim 11. Claims 3-5, 7-8, 10, 12-13, 15, and 17-19 include all the distinguishing features of claims 1, 2, and 11, respectively, and other distinctive features and elements. Therefore, Claims 3-5, 7-8, 10, 12-13, 15, and 17-19 are patentable for at least the same reasons as being discussed above with regard to claims 1, 2, and 11.

The Office Action of October 1, 2010 rejected claims 6 and 14 as being unpatentable over Stamper in view of Smalley and Lee, and further in view of Brenstein et al. (US 2002/0151150); rejected claims 9 and 16 as being unpatentable over Stamper in view of Smalley and Lee, and further in view of Yoshikazu Homma (“Growth of suspended carbon nanotube ...”); and rejected 20 as being unpatentable over Stamper in view of Smalley and Lee, and further in view of Widmann et al. (US 2001/0012658), all under 35 U.S.C. §103(a).

Applicants respectfully disagree.

Claims 6, 9, and 20 depend from claim 1 and claims 14 and 16 depend from claim 11. Claims 6, 9, 14, 16, and 20 include all the distinguishing features of claims 1 and 11, respectively, as well as additional distinctive features and elements. Claims 6, 9, 14, 16, and 20 are patentable for at least the same reasons as being discussed above with regard to claims 1 and 11, respectively.

In view of the above, Applicants respectfully request that rejections of claims 1-20 made under 35 U.S.C. §103(a) be withdrawn.

Conclusion

In view of the preceding remarks, Applicants respectfully submit that all pending claims are now in condition for allowance. Favorable reconsideration and allowance of the claims are respectfully requested.

No fees are believed to be due in connection with this paper. However, if there are any such fees due, please charge any such fees to the deposit account No. 09-0458.

Respectfully submitted,

/Yuanmin Cai/

Yuanmin Cai, Ph.D.
Agent for Applicants
Registration No. 56,513

Dated: November 22, 2010

INTERNATIONAL BUSINESS MACHINE CORPORATION

Intellectual Property Law Department, East Fishkill

2070 Route 52, Bldg-321, Zip-482

Hopewell Junction, NY 12533

Tel: (845) 894-8469

Fax: (845) 892-6363